

Armed Forces College of Medicine

AFCM

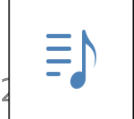




Pleura

Meninges & subarachnoid spaces
Ventricular System & CSF)
(Circulation

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Ass. Prof of Anatomy



INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

1. Describe the cranial meninges and ventricular system of the brain
2. List the cranial meningeal spaces and their function
3. Enumerate the sites & functions of subarchanoid cisterns
4. recognize the formation, circulation & absorption of the C.S.F.

Key points



1. **Cranial meninges, cranial meningeal spaces & Subarachnoid cisterns**
2. **Formation, circulation & absorption of the C.S.F.**

Cranial Meninges



1. Dura Mater: Composed of 2 layers:

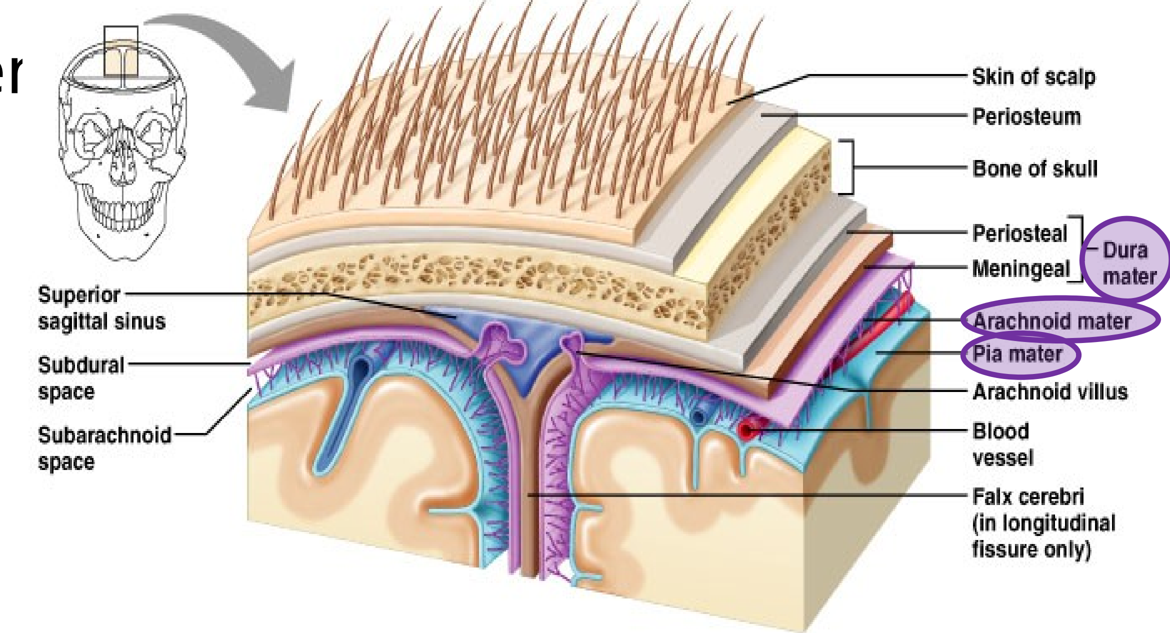
(2 layers fused, except to enclose dural venous sinuses or to make dural folds)

- **a) Periosteal** – outer layer, attaches to bone.
- **b) Meningeal** – inner layer, closer to brain.

2. Arachnoid Mater: spider

3. Pia Mater: delicate, follows convolutions & dipped in brain sulci.

- Forms **denticulate ligaments**.
- Pia mater + Blood vessels + Ependyma = **choroid plexuses of the ventricles.**



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Cranial Meningeal Spaces



Epidural space

Potential space bet. dura & bone.

Subdural space

Potential space between dura and arachnoid mater

Epidural space

Subdural space

Bridging vein

Subarachnoid space

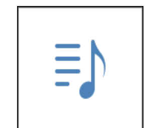
Cerebral artery

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Subarachnoid sp

Space Bet. archan

- Filled with CSF
- Contains the blood vessels supplying brain.



Subarchanoid cisterns



1. Cerebello medullary cistern (cisterna magna)

- below cerebellum.
- receives CSF from the 4th ventricle

2. Cistern of great Cerebral vein (cist ambiens)

- above cerebellum & below splenium of CC.
- Contains great cerebral vein.

3. Cisterna pontis:

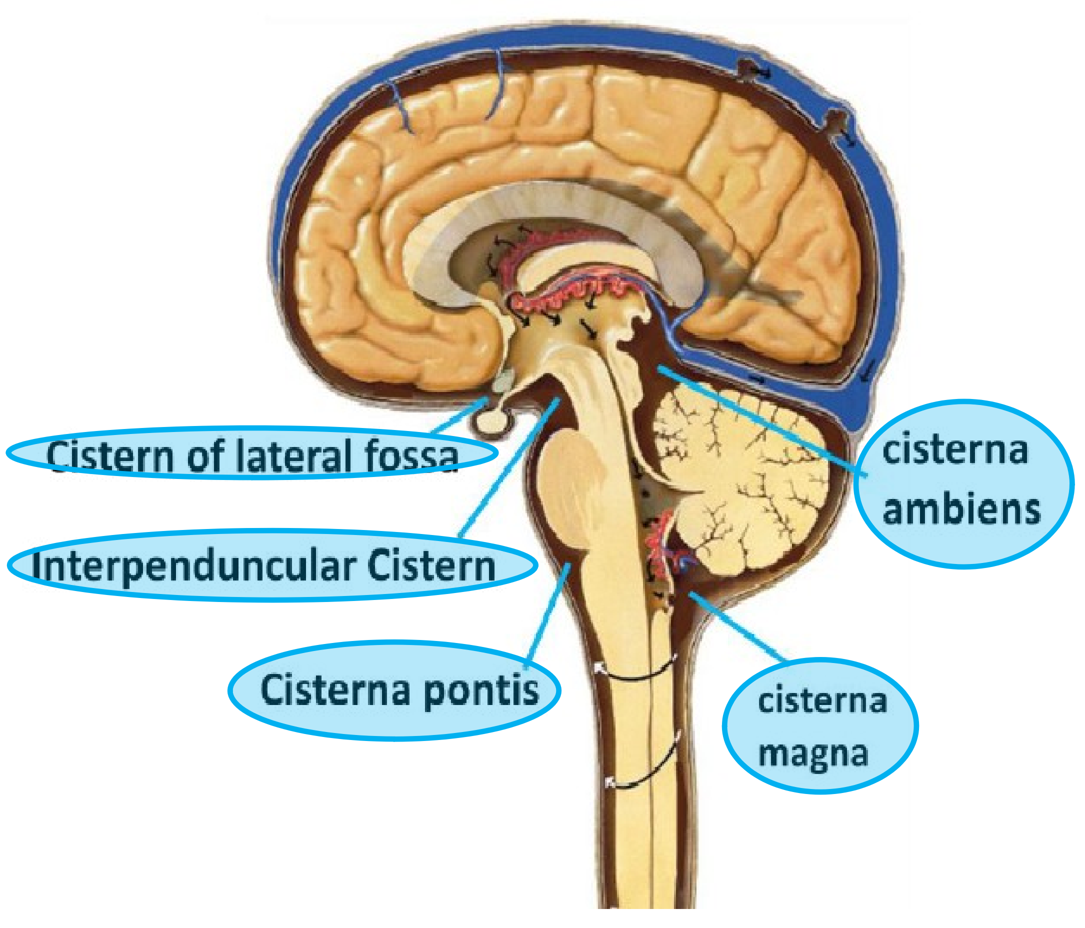
- on the ventral surface of pons.
- Contains basilar artery.

4. Interpenduncular Cistern:

- ventral to the interpeduncular fossa.
- Contains circle of Willis.

5. Cistern of lateral fossa:

- over the lateral sulcus.
- Contains MCA.



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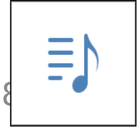


Lecture Quiz



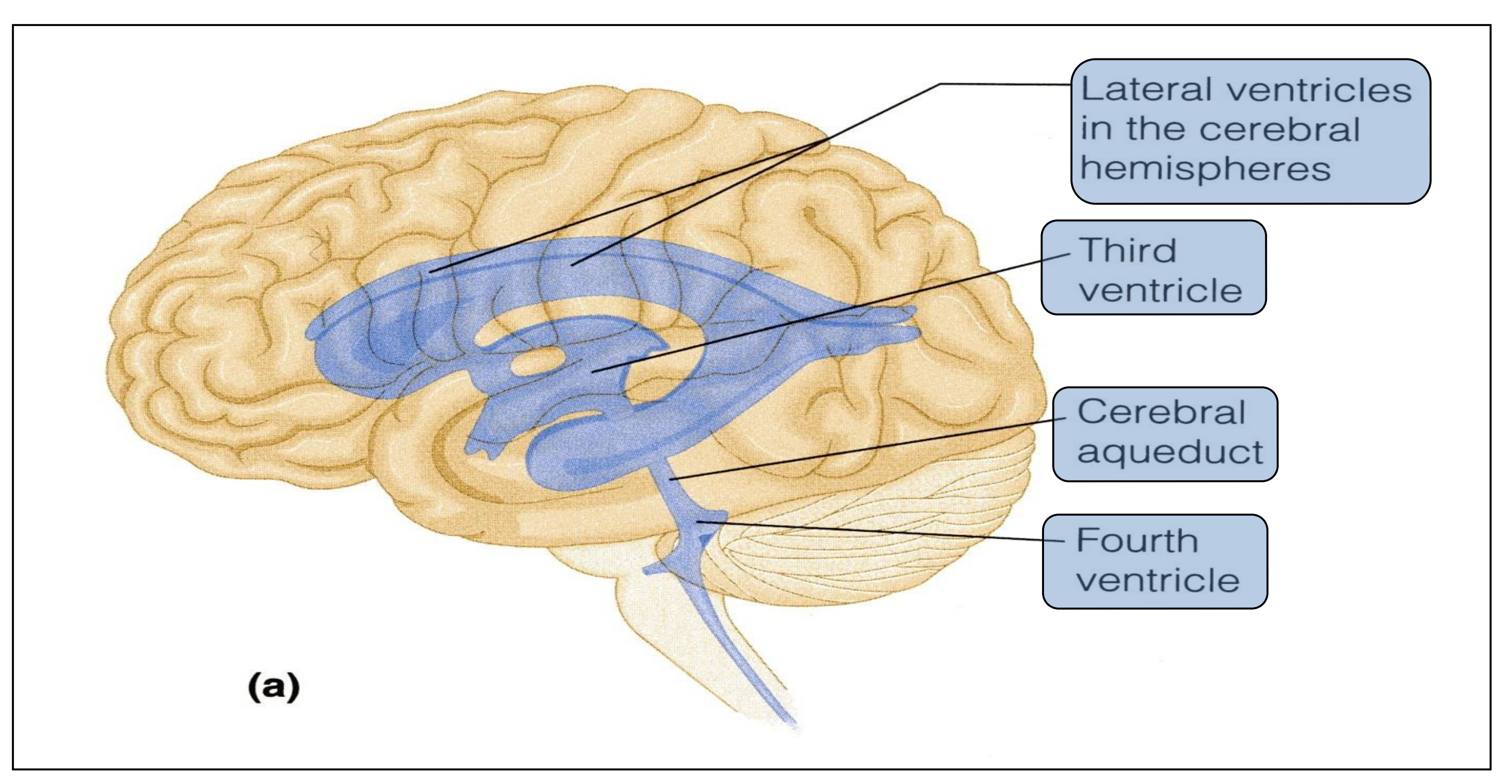
- The subarchanoid cistern present between cerebellum & splenium of C.C is called

a) Interpeduncular cistern
b) Cisterna ambiens
c) Cisterna magna
d) Cisterna pontis



Brain Ventricles





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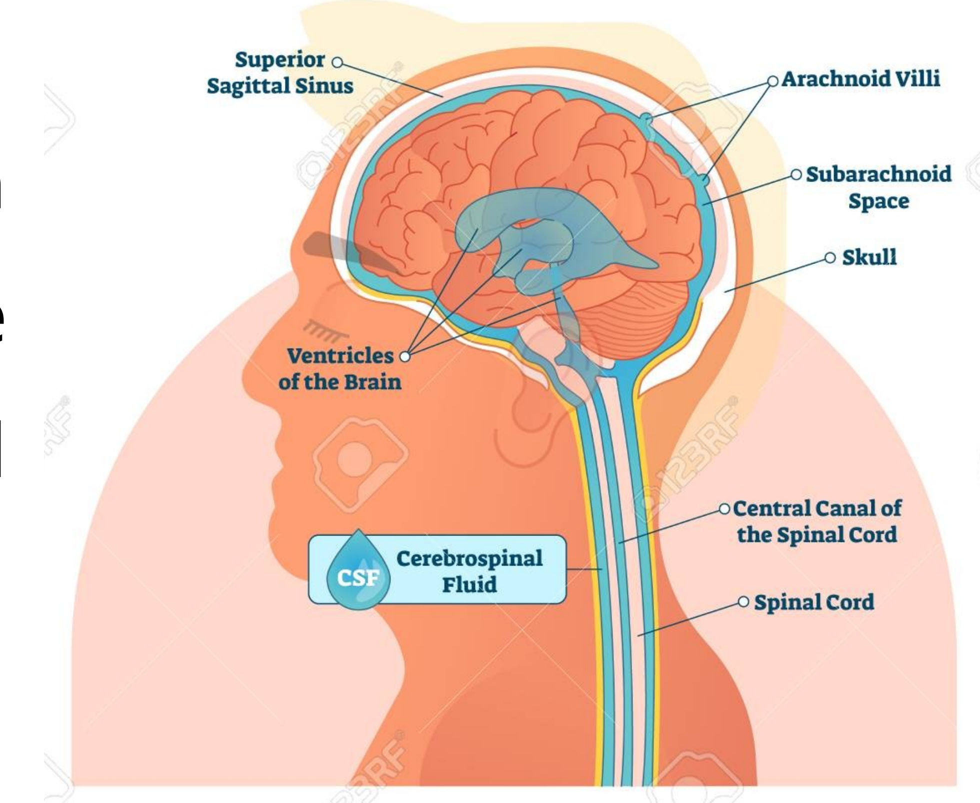
- The brain is bathed by the **cerebrospinal fluid** (CSF)
- Inside the brain, there are spaces **(ventricles)** filled with CSF
- There are 4 ventricles
  - **2 lateral ventricles** are in the brain hemispheres
  - **3rd ventricle** is in the diencephalon
  - **4th ventricle** is between the pons, open medulla and the cerebellum
  - The 3rd & the 4th ventricles are connected by the **cerebral aqueduct**



CSF



The cerebrospinal Fluid [CSF] is a clear, colorless fluid present in the cerebral ventricles, spinal canal, and subarachnoid spaces.



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Functions of CSF



1- Protects brain against trauma & acts as a water jacket

2- Maintains a constant intracranial pressure; any increase in brain volume is compensated by a decrease in CSF volume.

3- Removes the metabolic waste products through absorption (NO Lymph)

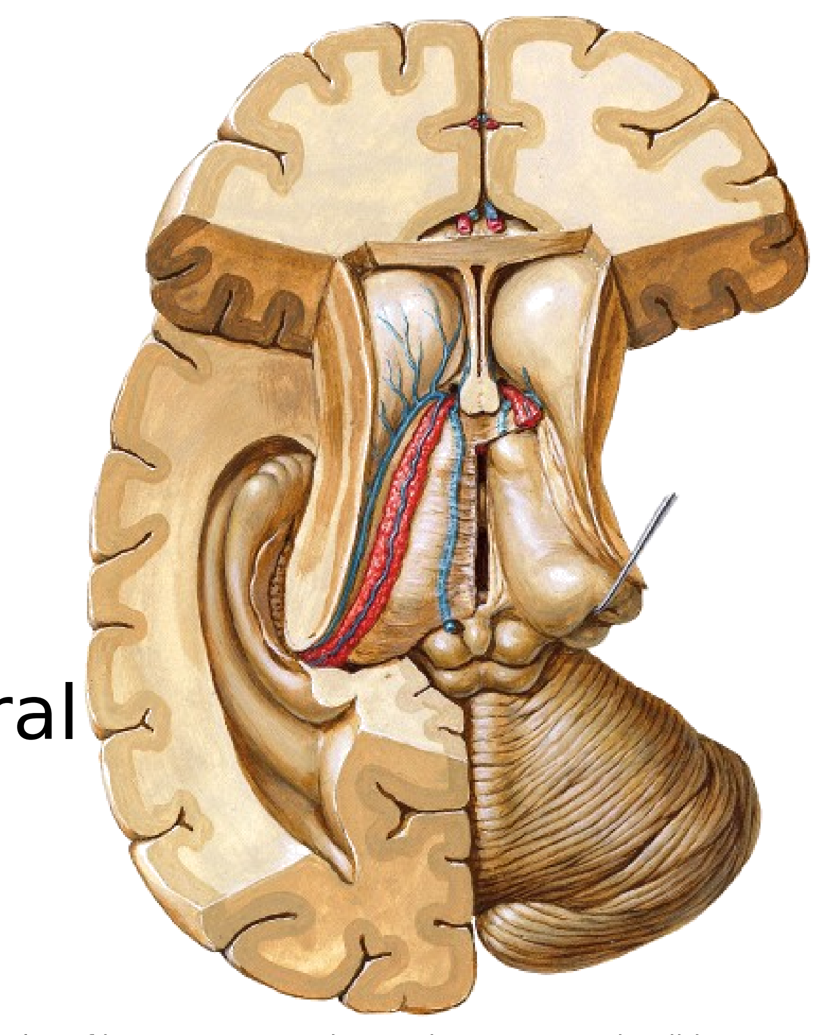
CSF Formation



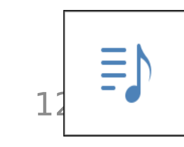
Total quantity: 130-150 ml

CSF is formed mainly by choroid plexus of ventricles (90% lateral ventricle)

A little amount is formed around cerebral vessels



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CSF Circulation



Lateral ventricle

↓ Foramen of Monro [Interventricular foramen]

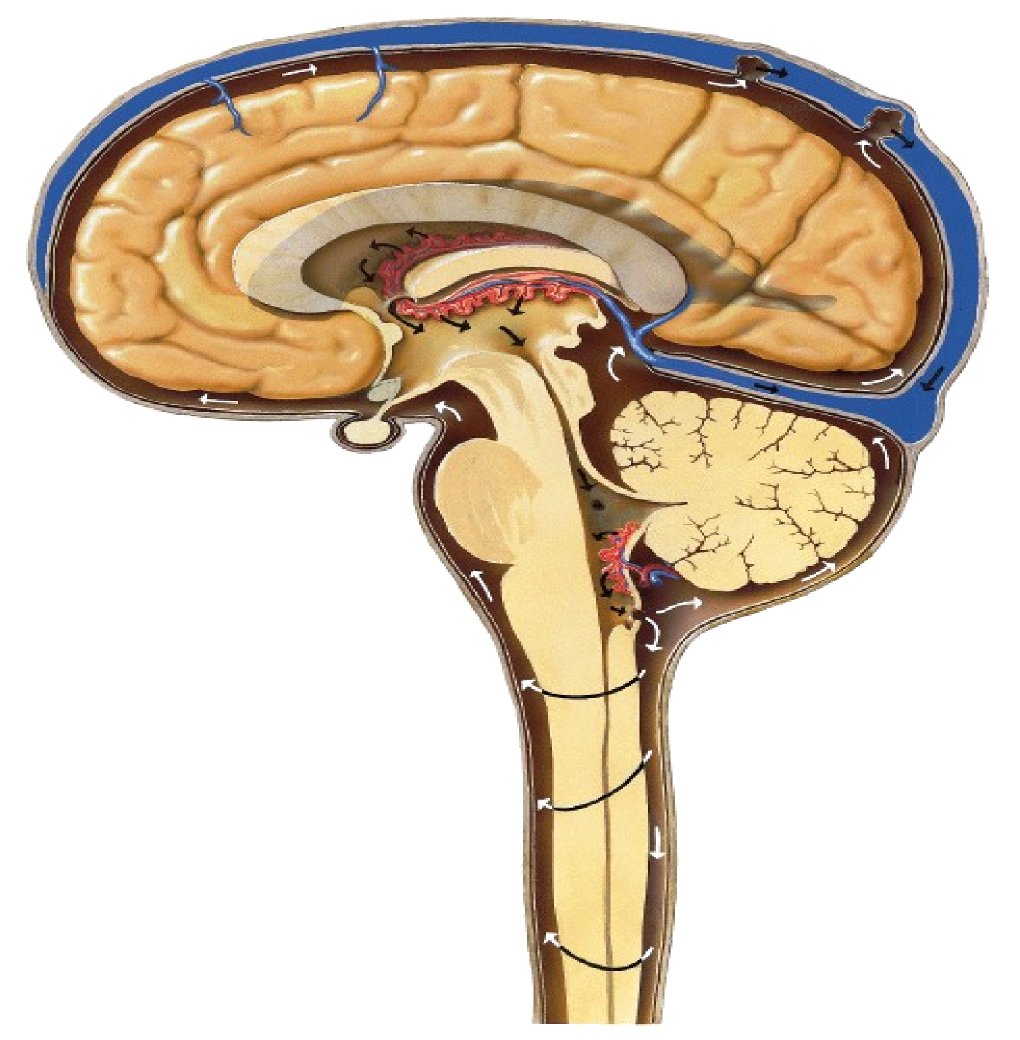
Third ventricle:

↓ Cerebral aqueduct

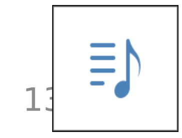
Fourth ventricle:

↓ median foramen (of Magendie) & 2 lateral foramina (of Luschka)

Subarachnoid space of Brain and Spinal cord



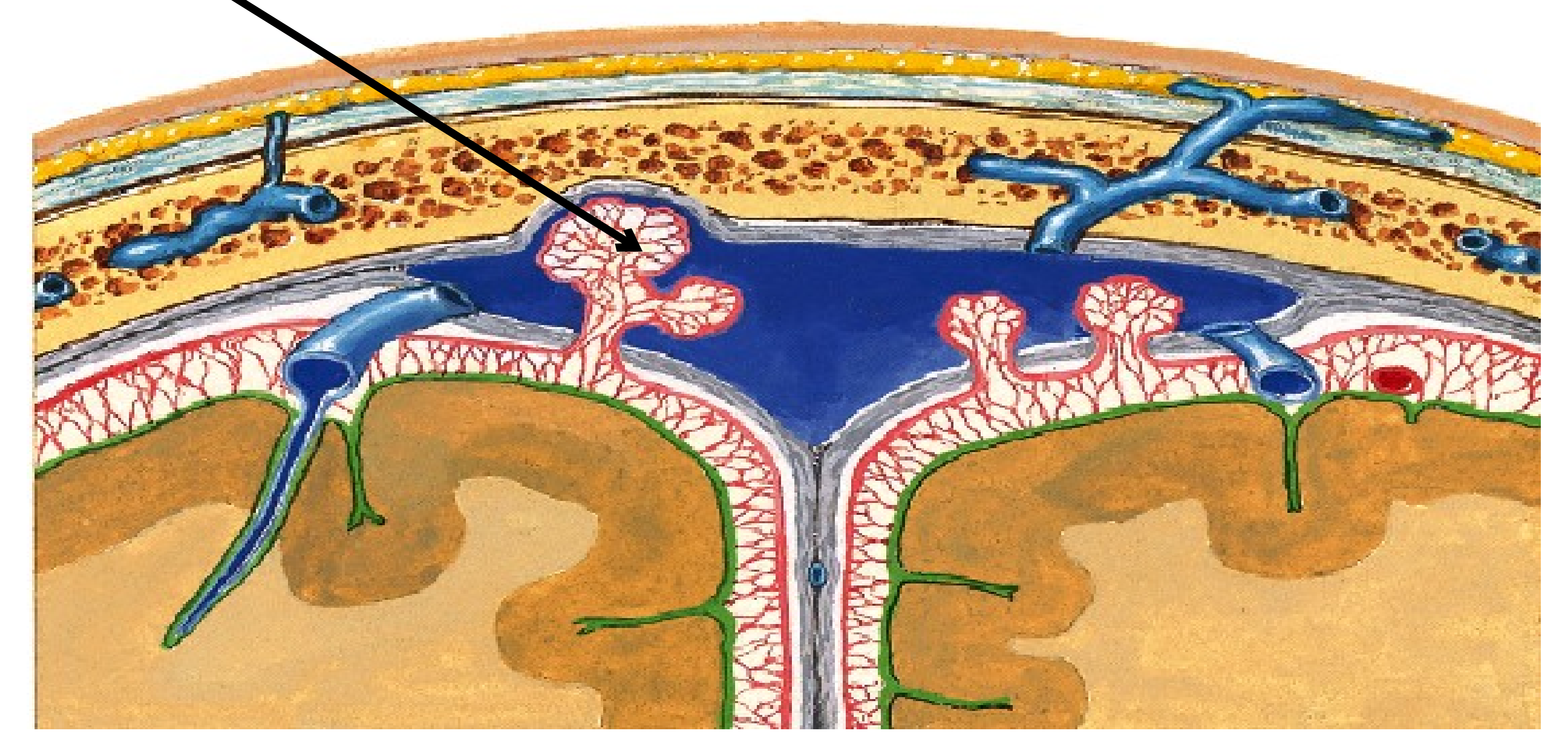
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CSF Absorption



Through arachnoid villi (finger-like projections of the arachnoid through the walls into venous sinuses especially SSS)



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Hydrocephalus



An increase in the volume of CSF within the skull

Due to : 1- Increase production
2- Decrease absorption
3- Obstruction in circulation



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Lecture Quiz

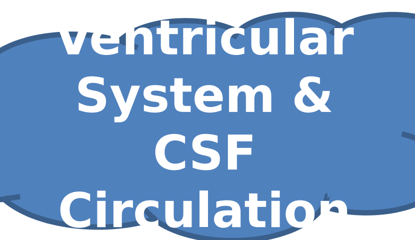


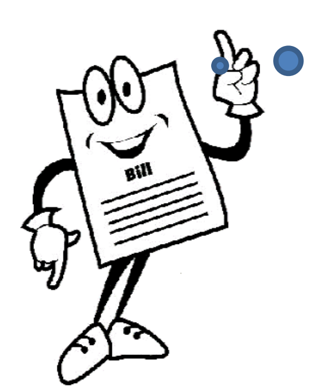
- The 3rd ventricle is connected to 4th ventricle by:

a) Interventricular foramen
b) Cerebral aquiduct
c) Central foramen of Magendie
d) Lateral foramen of Luschka

Lecture Summary







-Describe the cranial meninges and ventricular system of the brain
-List the cranial meningeal spaces and their function

-Enumerate the sites & functions of subarchanoid cisterns.

- recognize the formation, circulation & absorption of the C.S.F.

SUGGESTED TEXTBOOKS



1. Snell's Clinical Neuroanatomy -8th Edition

Atlas of human anatomy by Frank H. Netter, 6th Edition




Thank you!